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**Environmental certification as a buffer against the liabilities of  
newness and smallness: firm performance benefits**

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# **Environmental certification as a buffer against the liabilities of newness and smallness: firm performance benefits**

## **Abstract**

**Sustainable entrepreneurship initiatives encourage firms to focus on innovation, efficiency and environmentally friendly actions. Certification enables firms to accumulate legitimacy relating to the extent to which stakeholders know of and understand a firm's activities. Mobilization of the environmental certification resource is analyzed in the differentiated context of very young, young, micro and small firms to explore buffering against the liabilities of newness and smallness. Building upon insights from the resource-based view of the firm, institutional theory and signalling theory, we conceptualize environmental certification as an observable firm high-quality resource investment signal. This resource fosters innovation and encourages certified firms to accumulate and mobilize legitimacy. Regression analysis detected that the very young and micro firms that cited the compounded signal of certification reported significantly higher levels of effectiveness, but they did not report significantly lower levels of inefficiency. Micro firms that cited the compounded signal of certification reported weakly significantly higher levels profitability. Certification enables very young rather than young firms to address the liabilities of newness, and enables micro rather than small firms to address the liabilities of smallness. Implications are discussed.**

## **Keywords**

**Sustainable entrepreneurship, legitimacy, certification, signalling, liabilities of newness and smallness, firm performance**

## **Environmental certification as a buffer against the liabilities of newness and smallness: firm performance benefits**

### **Introduction**

An emerging discourse suggests that entrepreneurial practices are intertwined with environmental concerns and sustainable entrepreneurship. Sustainable entrepreneurship focuses upon “the process of discovering, evaluating, and exploiting economic opportunities that are present in market failures which detract from sustainability, including those that are environmentally relevant” (Dean and McMullen, 2007: 58). Environmental challenges, attributed to market failures (i.e., inefficiency, flawed pricing mechanism and imperfectly distributed information) are entrepreneurial opportunities, which if exploited can improve global environmental conditions, reduce market imperfections, and generate entrepreneurial rent (Cohen and Winn, 2007). The unique characteristics of smaller firms (i.e., flexibility, entrepreneurial orientation and structure) can foster innovative environmental practices that enhance firm performance (Aragón-Correa et al., 2008). However, this link has not been universally detected (Simpson et al., 2004).

Smaller firms are not homogeneous. Young and smaller firms that do not have a proven track record of accumulating entrepreneurial skills and business success can exhibit the liabilities of newness and/or smallness (Stinchcombe, 1965; Hannan and Carroll, 2000). The internal resources and prospects of the latter firms may be difficult for potential external investors to understand and value, which can be compounded by the firms short track record, or lack of credibility (Reuer et al., 2012). These liabilities can make it difficult for some young and smaller sustainable entrepreneurship firms to obtain the external resources (i.e., finance, technology, customers, suppliers, etc.) required for firm development. However, obtaining certification legitimacy can enable young and smaller firms to obtain flows of

external resources required for sustained competitive advantage, and superior firm performance.

Firm owners can possess superior information surrounding the quality of their firms. Owners of young and smaller private firms seeking external resources required for firm development need to address the information asymmetry barriers perceived by potential external resource providers. Due to uncertainty and incomplete information, some resource providers are reluctant to provide resources to young and smaller firms. The onus is, therefore, on owners of young and smaller firms to adapt (Villanueva et al., 2012). It may be essential for young and smaller private firms, particularly those engaged in innovative activities (De Clercq and Voronov, 2009), to accumulate and mobilize the legitimacy intangible resource. The latter resource signal of firm quality can be sought and favourably received by external resource providers.

Auditing and third-party certification programmes play a prominent role in promoting a firm culture focusing upon sustainability (Perego and Kolk, 2012). Certification can generate internal and external benefits for a certified firm (Singh et al., 2011). An environmental certification institution can facilitate firms to improve their internal processes, which may ensure enhanced efficiency, productivity and effectiveness. Acquisition of environmental certification can enable a firm to signal observable quality with regard to more efficient sustainable internal work practices, but also unobservable quality provided by the environmental certification. The signal of firm quality can be mobilized by firms to reduce information asymmetries between the firm and potential resource providers (King et al., 2005). Certified firms can be viewed as more plausible and trustworthy (Power, 2003) and more legitimate (Suchman, 1995).

Calls have been made for studies to focus on opportunities within the natural environment (Hall et al., 2010), and to monitor the benefits of sustainable entrepreneurship

practices (Lourenço et al., 2012; York and Venkataraman, 2010). Many young and smaller private firms are unaware of the potential benefits associated with environmental certification (McKeiver and Gadenne, 2005). The latter ‘ignorant’ owners may view certification as a potential cost on business (Hillary, 2004), rather than an investment in sustainable development that can promote competitive advantage (Ambec and Lanoie, 2008). To address attitudinal and financial barriers to the wider adoption of environmentally friendly entrepreneurial practices (Worthington, 2013), an evidence base is required that shows the types of young and smaller private firms that can enhance their performance due to obtaining certification. Environmental certification may be an important resource that can be mobilized by young and smaller private firms seeking to buffer the effects of the liabilities of newness (Wiklund et al., 2010) and smallness, respectively.

Despite a growing literature relating to the importance of ethical business activities in young and smaller firms (Harris et al., 2009), few studies have focused on sustainable entrepreneurship (Hall et al., 2010). The latter emerging discourse has been guided by insights from case evidence (Parrish, 2010), or from small sample surveys (Baden et al., 2011). Despite research progress, there is still a dearth of empirical evidence relating to the benefits associated with environmentally friendly actions. Whilst studies generally focusing on larger firms detect that environmental certification enhances firm performance (Ann et al., 2006; Nishitani, 2011), there is no clear and consistent link with regard to private firm performance. Some private firm studies suggest that certification is not significantly associated with firm performance (Watson et al., 2004), or that certification is associated with weaker firm performance (Zhao, 2008). Differences in the composition of the samples of firms (i.e., industry), methods of analysis, time periods and the selected performance measure generate variability. Some studies have failed to gather information from a random control group of comparable firms that have not invested in environmentally friendly actions. High

performing firms at one extreme, and poor performing firms at the other extreme may be more likely to seek to participate in sustainable entrepreneurship certification. The issue of selection bias (i.e., the sample of certified firms is not random and contains an over-representation of stronger (or weaker) firms) has been ignored in studies comparing the performance of certified and non-certified sustainable entrepreneurship private firms (Heras-Saizarbitoria et al., 2011). Studies have generally explored self-reported firm performance (Heras-Saizarbitoria and Boiral, 2013). There is now growing appreciation that firm performance needs to be monitored across several performance indicators (Worthington, 2013). Surprisingly, the benefits of environmental certification for different types of private firm according to age or employment size have not been ascertained.

Sustainable entrepreneurship is a fruitful context in which to examine the value that environmental certification provides to firms, particularly those that seek to mobilize the legitimacy accumulated from environmental certification to address the liabilities of newness or smallness. In this article, we seek to join the literatures on sustainable entrepreneurship, the resource-based view (RBV) of the firm and institutional theory with signalling theory to isolate what types of firms relating to firm age and employment size report enhanced firm performance through accumulating and mobilizing a high quality environmental certification resource. We explore this research gap by exploring the benefits of the Eco-lighthouse certification (ELC) sustainable entrepreneurship programme in Norway. The following research question is explored: Does participating in the ELC programme enable very young, young, micro and small ELC private firms to buffer against the liabilities of newness or smallness, and facilitate enhanced financial firm performance relative to private firms that have not obtained ELC? Here, firm performance is monitored in relation to effectiveness, inefficiency, and profitability (Hult et al., 2008).

This study keys into emerging debates, and we seek to make several conceptual and empirical contributions. In addition to bringing together the streams of research on sustainable entrepreneurship, legitimacy and signalling, our study offers two more specific contributions. We both replicate and extend previous research by monitoring the benefits associated with sustainable entrepreneurship. The concept of signalling has been widely used in management and other fields (Connelly et al., 2011; Reuer et al., 2012), and our work extends the theory to the study of sustainable entrepreneurship. Numerous theories and factors have been found to be associated with superior firm performance. There is widespread appreciation that the pool of resources available to a firm can shape venture development (Westhead et al., 2011). Building upon insights from the RBV of the firm, we suggest that certification is a resource that can be mobilized to accumulate additional resources required to ensure superior firm performance. We conceptualize environmental certification as a unique resource that fosters innovation. Certification generates internal action that promotes innovative practices, the development of strategy, and the implementation of new practices that can enable private firms to more efficiently deliver a market offering. Also, we view environmental certification as an observable high quality resource, which can be signalled by private firms to external resource-providers to ensure access to vital external resources. For sustainable entrepreneurship firms, our arguments suggest that the value of acquiring environmental certification can go beyond the immediate benefit of this signal (i.e., obtaining legitimacy) studied in prior studies. Certification can be an essential requirement when bidding for tender opportunities, and may become a hygiene factor relating to a necessary requirement to be allowed into the competitive game. We suggest this signal can facilitate superior competitive advantage and financial firm performance. Our specific theoretical focus is on the accumulation and mobilization of a legitimacy resource, which can be signalled to address information asymmetries perceived by external resource providers



considering supporting sustainable entrepreneurship firms seeking to deal with the liabilities of newness or smallness.

With respect to extending previous work, we explore whether very young (i.e., less than 5 years old), young (i.e., between 6 and 15 years old), micro (i.e., between 1 and 9 employees) and small (i.e., 10 to 49 employees) private firms, which have accumulated the certification legitimacy resource are able to report enhanced competitive advantage and financial firm performance relative to private firms that have not obtained environmental certification. The interaction effects between firm age and sustainable entrepreneurship, as well the interaction effects between firm employment size and sustainable entrepreneurship, are considered for the first time. We also extend understanding by examining the relationship between sustainable entrepreneurship and firm performance outside North American and European Community countries. The latter countries have provided the contexts within which the theoretical foundations of sustainable entrepreneurship studies have been traditionally grounded. A country's culture and institutional context can shape people's attitudes, access to resources and behaviour with regard to opportunity exploitation. Replication and extension of previous studies in contrasting geographic and cultural contexts is needed. We monitor the benefits of an environmental certification programme in Norway. To promote economic, social and environmental sustainability the Norwegian Government is encouraging firms to increase their resource-productivity, and reduce their harmful environmental impacts. The population of all private and public firms that invested in the ELC programme in Norway was identified.

We make a methodological contribution by gathering a large representative sample of the population of private limited liability companies with Eco-lighthouse certification (ELC). In addition, a large comparable control group of private limited liability companies with no Eco-lighthouse certification (NELC) was collected. Firm performance is monitored in

relation to effectiveness, inefficiency, and profitability. These three performance measures have generally not been explored together in sustainable entrepreneurship studies focusing on smaller private firm, because the data is generally not publicly available outside Norway. A Heckman two-stage regression procedure is employed to assess the potential issue of selection bias relating to the profile of ELC firms (i.e., is not random) relative to NELC firms. Factors associated with superior performance are detected using ordinary least squares (OLS) regression analysis.

This article is structured as follows. In the next section, the ELC programme is briefly summarized. Insights from several theories are then presented to suggest links between the ELC legitimacy resource and subsequent firm performance. Hypotheses are then derived. This is followed by a discussion of the research method and the data collected. Results are reported. In the following section, key contributions and implications are discussed. Finally, conclusions are presented.

### **Eco-lighthouse certification**

The Eco-lighthouse foundation is an environmental certification programme supported by the Norwegian Ministry of the Environment. It was established as a response to the Rio Earth Summit in 1992. The foundation helps firms to conduct profitable and environmentally friendly operations (Eco-lighthouse Foundation, 2012). The foundation promotes environmentally friendly practices with regard to their use of resources, energy, chemicals, waste-disposal, and transportation. Firms are encouraged to select their suppliers based on their ability to supply products and services that are eco-certified, or in accordance with the ELC requirements regarding energy, waste, transport, emissions, and procurement. Private firms seeking certification benefit from two external interventions relating to the certification implementation process. The first is by an external consultant that facilitates participating

firms to develop strategies that comply with industry specific requirements, but at the same time promote sustained competitive advantage and financial viability. The external consultant can, in addition, potentially significantly change the strategic direction of the ELC firm, and increase its operational fit with its customers. While the focus of these activities relates to environmentally friendly practices, the outcome can relate to the strategic position of the firm, and this may enhance subsequent firm performance. The second external intervention is from an independent third-party auditor. This auditor can provide knowledge and advice on how to best implement the proposed ELC practices. Only firms that implement all specified ELC practices (i.e., firm objectives, planning, quality control measurements, record keeping, and the training and education of employees) are awarded ELC. External interventions from the consultant and/or the auditor during the certification process, therefore, provide the opportunity to support both the design and implementation of a new and more appropriate strategy. Both external interventions can encourage firms to enter wider professional and social networks that assist in knowledge acquisition and exploitative learning activity (Hite and Hesterley, 2001). We recognize the importance of these external interventions, but we do not specifically monitor the specific benefits generated by the consultant or auditor in this evaluation.

The above discussion suggests that firms that accumulate the knowledge of an external consultant and/or auditor and the acquisition of ELC can mobilize an observable high quality legitimacy resource, which can be signalled to obtain resources from external resource providers. This signal is sought and favourably received by third parties in Norway. Government agencies by law are required to consider environmental impacts when procuring goods and services. Between 2004 and 2009, 65% of government procurement in Norway had environmental accountability as a requirement (Lambert and Solevåg, 2010). The Norwegian Government's innovation policy is encouraging firms to increase their resource-

productivity and reduce their harmful environmental impacts in order to promote economic, social and environmental sustainability via actors such as Innovasjon Norge, SIVA and Norges forskningsråd. The Confederation of Norwegian Enterprise (NHO) is the leading voice of business in Norway, and its Climate Panel encourages members of NHO to consider the environment. The Norwegian Confederation of Trade Unions is an ELC organization, and it encourages its members to proactively engage in environmental responsibility. ELC can, therefore, be an essential requirement when bidding for public and private sector tender opportunities. ELC can be viewed as a hygiene factor relating to a necessary requirement to be allowed into the competitive game.

The ELC licence is valid for three years. It can be renewed if the firm complies with ELC requirements, which are continuously evaluated and increased relating to market and regulatory standards. The cost (i.e., for the external consultant, independent third-party audit and certification certificate) of obtaining ELC increases with firm size. For micro and small firms the initial cost to obtain ELC relates to approximately 0.08% and 0.03% of their sales revenues, respectively. The annual fee to renew the certificate relates to 0.01% of sales revenue.

## **Theoretical insights and derivation of hypotheses**

### *The environmental certification resource and opportunities for superior performance*

The RBV of the firm questions the assumed dominant power of external environmental conditions. This micro-level perspective (Barney, 1991) suggests a sustained competitive advantage for a firm requires resources that are idiosyncratic to the firm, which are valuable, rare, and neither perfectly imitable (i.e., a valuable resource is controlled by only one firm) nor substitutable without great effort. Resources can be tangible or intangible. They can be

accumulated from the internal and external environment of the firm. Firms are viewed as being heterogeneous with regard to the resources they control.

Despite wider availability of certification initiatives, many micro and small firms due to ignorance and/or financial reasons do not acquire the certification resource. As intimated above, they do not acquire the certification resource because they are unaware of the benefits of certification. In many cases, certification is viewed as a cost rather than an essential investment ensuring superior firm competitive advantage and performance. Certification process requirements can put off many micro and small firms from obtaining certification. The process is associated with stringent requirements set by external consultants, and detailed monitoring of firm behaviour by external auditors. The certification resource is a unique resource for most young and small firms.

Environmental certification is an organizational effort to deter misconduct. Certification is a method to invest in uniqueness. It is a form of organizational innovation (Gallego et al., 2012), which through strategic renewal (i.e., new sources of supply or materials, introduction of new organizational roles, functions and work practices, more appropriate and transparent auditing practices, etc.) can promote firm adaptation and development. Specifically, the certification standard can require firms to implement internal procedures that ensure reduced energy consumption, more efficient use of energy, and reduced fuel consumption in order to lower emissions. Also, firms can be required to implement procedures that ensure reduced waste of paper and packing materials (Eco-lighthouse Foundation, 2012). New organizational methods relating to business practices can facilitate a more efficient use of resources (i.e., more cost-efficient production) in order to reduce pollution (Porter and Van der Linde, 1995). Organizational innovation relies on knowledge-based skills that are difficult for competitors to replicate, and it can be a source of

competitive advantage and superior financial performance. This organizational innovation can promote firms to seek and assimilate external knowledge to ensure venture development.

Certification can play a dual role in addressing issues relating to a firms internal and external environment (Singh et al., 2011). The certification programme can specify the adoption of specific management practices and systems. Also, the programme promotes the utilization of external intervention to ensure all firms obtain the specified certification standards. As intimated above, an independent external consultant and/or auditor ensure the implementation of specified environmental certification practices. In addition, they can provide new knowledge and enable firms to mobilize current and new contacts, and encourage change in strategic direction to increase operational fit with current and future customers. The external auditing process can narrow the distance (i.e., the truthfulness of a firms efforts to reduce harmful impact on the natural environment) between a firm and a potential external resource provider (King et al., 2005).

Institutional theorists suggest legitimacy is a generalized perception relating to actions of an entity that are desirable or appropriate within a socially constructed system of norms, values, beliefs, and definitions (Suchman, 1995). Environmentally responsible firms can be perceived as novel and distinctive within their market category (Miles and Covin, 2000). Legitimate firms are generally considered more worthy, meaningful and trustworthy, and thus more likely to obtain vital external resources (Zimmerman and Zeitz, 2002). Legitimacy can be viewed as an intangible resource that a firm can acquire from the external environment, which it subsequently can use to meet established goals (Suchman, 1995). Congruent with the strategic tradition of organizational legitimacy, legitimacy can be achieved by conforming to institutionalized conventions. The instrumental use of legitimacy relates to the manipulation of symbols, or conformity to particular frames to reduce information ambiguity, and to obtain societal support (Pacheco et al., 2010a). This conformity (or isomorphism)

facilitates taken-for-grantedness, comprehensibility, and reduced ambiguity (Doh et al., 2010).

Engagement in a certification programme can enable firms to accumulate a certification legitimacy resource. Certification can stimulate cognitive legitimacy relating to the extent to which resource providers know of, and understand, a private firm's activities (Aldrich and Fiol, 1994). The certification institution ensure that firms adhering to all rules and procedures are rewarded with increased effectiveness, whilst firms reporting any defecting (i.e., environmental degradation) behaviour are punished through a loss of societal support (Pacheco et al., 2010b). Institutional endorsement can ensure that private firms provide reliable information that otherwise would be difficult to obtain in an unbiased form (Doh et al., 2010). The legitimacy resource can be mobilized to reduce or eliminate the lack of trust perceived by some external stakeholders, and raise the credibility of private firms (King et al., 2005). Certified firms can mobilize this signal of firm quality, and use it to differentiate themselves from competitors (McWilliams and Siegel, 2011). They can establish closer collaborations with trading partners (both current and potential) that place value on environmental efforts. The endorsement provided by membership in a group can open doors to new networking contacts (Carayannopoulos, 2009), as well as stimulate complementary and reinforcing relationships (Potoski and Prakash, 2005). Environmental certification can thus promote a focus on innovation relating to new work practices and workforce organization, new administration and office systems, and new sources of supply or materials. Certification can facilitate a firm to develop broader and denser networks and social capital. The latter 'know who' resource and the mobilizing of ties with others can build a reputation for trustworthiness (Wong and Boh, 2010). The resulting increased firm legitimacy and credibility can be mobilized to enhance firm performance.

### *Signalling observable firm quality to external resource providers*

An information asymmetry barrier between owners of young and smaller firms and external resource providers (i.e., firm owners possess superior information surrounding the quality of their firms) can retard the flow of vital external resources to firms. Acquiring information to resolve information asymmetry problems can be costly for potential external investors. Private firm assets (and liabilities) may not be readily observable, and potential external investors can be reliant upon the information the firm is willing to share (Spence, 2002). Signalling theorists reject the assumption of perfect information held by signallers (i.e., private firms) and receivers (i.e., potential resource providers such as government, financiers, customers, suppliers, etc.). They focus on the credible communication of positive information to convey positive organizational attributes. A resource signal highlights the unobservable quality of the signaller to potential receivers via the observable qualities of the signal. Signal quality concerns the underlying unobservable ability of the signaller to fulfil the demands of an outsider observing the signal (Connelly et al., 2011).

Receivers such as potential external investors need to distinguish between high- and low-quality signallers. If receivers are unable to distinguish between high and low-quality firms they may decide not support some young and small firms. External pressure can generate the need for private firms to obtain certification. For example, in some industries, certification is an essential requirement for tender opportunities. External resource providers seeking to minimize potential losses can solely support firms that provide high-quality signals, which are independently monitored to a consistent specified standard. Irrespective of whether there is external actor pressure for certification or not, firms can seek certification to communicate their underlying quality attributes, and to gain an advantage compared to their non-certified competitors. Certification can lower search and monitoring costs by external resource providers. It can ensure that credible information relating to previously unspecified



organizational attributes and behaviour (King et al., 2005) is consistently reported to potential external resource providers. Private firms can thus use the public act of certification to reduce information asymmetries between their firms and potential external resource providers. High-quality firms that signal may receive Payoff A, but only Payoff B when they do not signal, whilst low-quality firms receive Payoff C when they signal and Payoff D when they do not signal (Kirmani and Rao, 2000). Signalling is a viable strategy for high-quality firms when  $A > B$  and when  $D > C$ . Thus, young and smaller firms focusing on promoting sustainable development (Lourenço et al., 2012) with environmental certification can accumulate a legitimacy resource (De Clercq and Voronov, 2011), which can be signalled to obtain resources from external resource providers required to enhance firm performance.

#### *Addressing the liabilities of newness or smallness*

A young private firm with little, or no record of past performance on which to base claims for legitimacy, can be deficient in the resources required to ensure firm development. Young firms can suffer from the liabilities of newness. Choi and Shepherd (2005: 575) assert that, "... the liability of newness relates to the actions and learning that the management team and employees must undergo to overcome the major challenges of adaption to the internal and external environments of new organizations". Young firms can lack some of the beneficial attributes (i.e., legitimacy, reliability and accountability) of established organizations. They may need to deploy symbols or particular frames to address the following problems associated with the liabilities of newness (Stinchcombe, 1965). For example, firms need to invest resources and time in creating new organizational roles and functions, knowledge and learning. They can focus on inventing and learning new roles, which requires negotiation with others in the organization to agree new roles, responsibilities, and relationships. Firms need to become less reliant on social relations with strangers associated with low

interpersonal trust, and potentially precarious relationships between co-workers. Also, firms need to establish relationships with other organizations. This is because they may not have built stable ties with customers and suppliers. Accordingly, young firms can face internal organizational hurdles, and they need to accumulate legitimacy in order to better deal with potential external stakeholders (Wiklund et al., 2010), to ensure improved access to vital resources (Zimmerman and Zeitz, 2002).

The absence of ingrained routines and mindsets associated with increased firm age and experience can enable some younger firms to explore and learn faster (or more easily) the innovative practices nurtured during the certification process (Dibrell et al., 2011). The development of new internal procedures can enable a young firm to enhance its resource-productivity, and lower its costs (Porter and Van der Linde, 1995). Due to changing societal expectations, sustainable entrepreneurship firms can garner pragmatic legitimacy by focusing on the growing demand for green products and services. They can also garner moral legitimacy by embracing socially accepted techniques and procedures (Suchman, 1995), for example, relating to waste management and pollution prevention.

Young firms generally lack the familiarity and credibility enjoyed by established and large organizations (Aldrich and Fiol, 1994). In addition, they can find it difficult to comply effectively with rising institutional expectations with regard to corporate environmental responsibility (De Clercq and Voronov, 2011). Young sustainable entrepreneurship firms can lack cognitive legitimacy relating to the extent to which stakeholders know of, and understand a firm's activities. Cognitive legitimacy is often achieved through the formalization and codification of informal procedures (Suchman, 1995). Young firms with limited social capital (i.e., paucity of relationships with other organizations, especially external resource providers) may, thus seek to obtain the environmental certification legitimacy resource from a recognized institution. Young and smaller firms focusing on promoting sustainable

development (Lourenço et al., 2012) with environmental certification can subsequently signal this legitimacy intangible resource (De Clercq and Voronov, 2011), to manage their liabilities. Legitimacy can be mobilized to create opportunities (Bengtsson and Johansson, 2012). Development of a growing network of contacts can enable a new firm to obtain the necessary resources for successful early stage growth (Hite and Hesterly, 2001). Application of signalling theory to the context of sustainable entrepreneurship suggests that environmental certification can be useful to a young sustainable entrepreneurship firm seeking to obtain external resources required to ensure firm development. The innovative practices and the increased flow of external resources after certification can enable younger sustainable entrepreneurship firms with certification to address the liabilities of newness, and to perform better than comparable firms that do not have the certification legitimacy resource to signal. This discussion suggests the following hypotheses:

H<sub>1a</sub>: Young firms with the ELC resource will report higher levels of effectiveness.

H<sub>1b</sub>: Young firms with the ELC resource will report lower levels of inefficiency.

H<sub>1c</sub>: Young firms with the ELC resource will report higher levels of profitability.

Smaller firms with limited human capital often lack the technical expertise needed for innovation and strategic renewal. The ELC auditing process provides advice surrounding how internal organizational hurdles can be addressed. The technical expertise provided by certification programme consultants can stimulate and provide flexible smaller firms (Chen and Hambrick, 1995) with valuable information on how to reorganize their resources more efficiently (Perego and Kolk, 2012), and to focus on innovation. The ELC legitimacy quality resource could be signalled by smaller firms in order to obtain external financial resources required to pursue marketing and technological differentiation strategies in line with

sustainable entrepreneurship agendas. Paralleling the arguments above, we therefore advance the following hypotheses:

H<sub>2a</sub>: Smaller firms with the ELC resource will report higher levels of effectiveness.

H<sub>2b</sub>: Smaller firms with the ELC resource will report lower levels of inefficiency.

H<sub>2c</sub>: Smaller firms with the ELC resource will report higher levels of profitability.

## **Method**

### *Sample, data collection and respondents*

The population of 1,359 ELC firms in Norway with certification by 31/12/2009 was obtained from the Eco-lighthouse foundation. Statistics Norway and the Brønnøysund Register Centre provide information to the Proff Forvalt database. The latter database holds information relating to the population of all limited liability companies in Norway with regard to firm employment size, age, location and industry in 2009, as well as financial accounts for several years. Public ELC firms were excluded from the ELC private firm sampling frame. With reference to the Proff Forvalt database, 576 out of 1,101 ELC limited liability companies provided complete financial data relating to three performance measures. A control group of private limited liability companies that had not obtained ELC was obtained from the Proff Forvalt database. Each of the 576 ELC firms was simultaneously matched with a randomly selected NELC firm in relation to legal ownership, number of employees in 2009, industry, sales turnover in 2009, and county location. Data was collected from 1,152 private firms.

*Sample characteristics.* On average, ELC firms were 17.7 years old and employed 33 people whilst NELC firms were 17.2 years old and employed 31 people. In total, 63, 309, and 204 ELC firms were very young, young and mature (i.e., more than 15 years old) firms,

respectively. Further, 185, 287 and 104 were micro, small and medium (i.e., between 50 and 250 employees) firms, respectively. In comparison, 72, 319, 186 and 286 NELC firms were very young, young, micro and small firms, respectively. With regard to industry, 236, 177 and 163 ELC firms operated in trade, manufacturing and service industries, respectively. Similarly, 236, 177 and 163 NELC operated in trade, manufacturing and service industries, respectively.

*Sample representation.* Chi-square tests confirmed no statistically significant differences between the total sample of 1,152 firms (i.e., ELC and NELC firms) and the population of firms in Norway with regard to industry and county location at the 0.05 significance level. On these criteria, we have no cause to suspect that the surveyed total sample is not representative of the population of private firms. The ELC programme is generally targeted toward small and medium-sized firms rather than micro firms. A chi-square test confirmed at the 0.01 significance level that the surveyed sample has markedly fewer micro firms than the population of firms.

### *Measures*

*Dependent variables.* The causal link between firm certification and three firm performance measures was explored. Performance of ELC and NELC firms in 2009 was monitored with regard to their subsequent performance in 2010. Three performance dependent variables relating to all firms were obtained from the Proff Forvalt database. Firm effectiveness is the natural log of total operating revenue per employee in 2010 (Effectiveness). Inefficiency is the natural log of cost of goods sold per employee in 2010 (Inefficiency). Firm profitability is the ratio of operating profit relative to total assets in 2010 (Profit).

*Independent variables.* With regard to information held on the Eco-lighthouse Foundation database, ELC firms in 2009 were allocated a value of '1' and '0' otherwise. In relation to information held on Proff Forvalt database, firms less than 5 years old in 2009 were allocated a value of '1' and '0' otherwise (Very Young), and firms between 6 and 15 years old in 2009 were allocated a value of '1' and '0' otherwise (Young). The reference category was firms 16 or more years old (Mature). Firms with between 1 and 9 employees in 2009 were allocated a value of '1' and '0' otherwise (Micro), and firms with between 10 and 49 employees in 2009 were allocated a value of '1' and '0' otherwise (Small). The reference category was firms with between 50 and 250 employees (Medium).

Interaction effects (Yip and Tsang, 2007) between ELC and firm age and employment size, respectively were considered. The following interaction variables relating to firm age were computed by multiplying the Very Young variable with the ELC variable (Very Young x ELC), the Young variable with the ELC variable (Young x ELC), the Micro variable with the ELC variable (Micro x ELC) and the Small variable with the ELC variable (Small x ELC).

*Control variables.* Firm location can shape access to resources and competition for resources. With regard to information held on Proff Forvalt database, the location of each firm's main premises was ascertained. A distinction was made between firms located or not in towns with more than 100,000 people (no = '0', yes = '1'). Industry environments differ regarding entry costs, average performance, reinvestment intensity and sunk costs, which can shape individual firm performance. Statistics of Norway provided secondary data on industry munificence and dynamism. Munificence was calculated as the logarithm of growth in sales in the industry in which the firm operates relating to the two-digit Norwegian Standard Industrial Classification (SIC) code over the 2007 to 2010 period. Dynamism was calculated as the volatility of sales in the industry in which the firm operates relating to the two-digit SIC code over the 2007 to

2010 period. The main industrial activity of each firm was ascertained from the Proff Forvalt database. The following two industry variables were considered as control variables: trade (no='0', yes='1') and manufacturing (no='0', yes='1'). Organizational slack can promote a focus on environmental responsibility. With regard to information held on Proff Forvalt database, slack is the natural log of total firm debt as a proportion of total firm assets in 2010 (Slack). Market share relates to a firm's total sales revenue in 2010 gathered from Proff Forvalt database as a proportion of the average total sales revenue of firms in the same two digits Norwegian SIC in 2010 gathered from Statistics of Norway (Market). The Market control variable was log transformed.

#### *Common method bias*

Collecting information from the Eco-lighthouse foundation, Proff Forvalt database and Statistics Norway archival data sources minimized common method bias. All independent and control variables were included in a principal components analysis. The Harman one-factor test suggests no evidence of common method bias.

#### *Data analysis*

A correlation matrix of the control and independent variables is presented in Table 1. Variance inflation factor (VIF) scores were computed, and they suggest no serious problem with multicollinearity. Private firms are able to self-select onto the ELC programme or not. Consequently, observed subsequent firm effectiveness, inefficiency and profitability may be conditional upon unobserved factors that are linked to the self-select decision. The Heckman two-stage approach is used to check for potential selection bias (i.e., the independent signalling variables and unobservable factors might influence firm performance, and bias the interpretations (Reuer et al., 2012)) between the performance of ELC and NELC firms. This

approach identifies both a method of testing for selection effects between ELC and NELC firms, and for consistent estimation if selection effects are shown to be statistically significant. No selection bias (i.e., the ELC sample is random) was detected with regard to participation in ELC in relation to each dependent variable. Consequently, there was no need to run a two-stage Heckman procedure. OLS regression models relating to the control, independent and interaction variables are presented to test the proposed hypotheses.

## **Results**

The first step of the Heckman test explores the issue of selection bias relating to the profiles of ELC firms. With regard to the total sample of ELC and NELC firms (i.e., 1,152 firms), a probit regression analysis was estimated relating to the propensity to be an ELC firm or not. Variables (observables) included in step 1 need to be different from those included in step 2 (i.e., relating to a firm performance dependent variable). At least one independent variable has to be included in step 1 but not step 2, which is theoretically associated with the propensity to participate in ELC but not firm performance (Robson et al., 2012). Institutional theorists suggest that firms can seek to reduce harmful environmental impacts in response to societal norms (Meek et al., 2010). Three recycling measures were obtained from the Statistics Norway database relating to county variations in rates (i.e., percentage of a county's population living in municipalities that collect and recycle in 2004) of plastic, paper and glass recycling, and included in the step 1 model. Model 1 in Table 2 is the step 1 Heckman model relating to the control, selection and independent variables focusing on participation in the ELC programme or not. A generalized residual variable (i.e., the inverse Mills ratio), which is a function of the correlation between the disturbances of the probit model, was considered during step 2 in the Heckman approach for each dependent variable. The OLS regression analysis relates to the control and independent variables, but not the three recycling selection



variables. Standard errors were corrected for heteroscedasticity. If the Inverse Mills ratio is significant from zero during step 2, it suggests that the OLS model is distorted by bias (Wooldridge, 1995). The Inverse Mills ratio relating to step 2 Model 2 in Table 2 is not significant at the 0.1 significance level. This suggests that OLS model focusing on firm effectiveness relates to a random sample of ELC firms, and the step 2 model is not distorted by selection bias. The two-stage approach was repeated for the other two dependent variables. The Inverse Mills ratio for Model 4 is not significant relating to control and independent variables, and suggests that the step 2 model relating to firm inefficiency is not distorted by selection bias. Further, Model 6 suggests that the step 2 model focusing on control and independent variables relating to firm profitability is not distorted by selection bias. All the OLS regression models relating to the three dependent variables were estimated without correcting for selection bias.

Model 3 is the effectiveness full model that includes the control, independent and interaction variables ( $R^2 = 0.32$ ,  $p < 0.01$ ). Very young ELC firms reporting the compounded credible high-quality signal of certification (Very Young x ELC) reported significantly higher levels of effectiveness. Also, micro ELC firms reporting the compounded credible high-quality signal of certification (Micro x ELC) reported significantly higher levels of effectiveness. However, Young x ELC and Small x ELC were not individually statistically significant. Hypotheses  $H_{1a}$  and  $H_{2a}$  are supported.

Model 5 is the inefficiency full model that includes the control, independent and interaction variables ( $R^2 = 0.14$ ,  $p < 0.01$ ). None of the firm age and employment size interaction variables were significant. Hypotheses  $H_{1b}$  and  $H_{2b}$  are not supported.

Model 7 is the firm profitability full model that includes the control, independent variables, and interaction variables ( $R^2 = 0.20$ ,  $p < 0.01$ ). Micro ELC firms reporting the compounded credible high-quality signal of certification (Micro x ELC) reported weakly

significantly higher levels of profitability. Hypothesis H<sub>1c</sub> is not supported, but H<sub>2c</sub> is weakly supported.

### **Contributions and implications**

Despite recent research progress, the benefits of sustainable entrepreneurship initiatives are poorly understood. This study explores the external validity of theoretical perspectives generated in North American and European Community contexts with reference to private firm behaviour in Norway. We advance sustainable entrepreneurship research by presenting a signalling theory of certification legitimacy resource accumulation and mobilization to enhance the financial performance of young and smaller private firms seeking to address the liabilities of newness or smallness. Sustainable entrepreneurship studies explore the environmentally friendly practices that promote innovation, efficiency and sustainable entrepreneurship, whilst the RBV of the firm and institutional theory focus on the accumulation and mobilization of the legitimacy resource, which facilitates taken-for-grantedness, comprehensibility and reduced ambiguity. This study contributes to recent research on the signalling benefits of the legitimacy resource. Drawing together the streams of research on sustainable entrepreneurship, legitimacy and signalling, we conceptualize environmental certification as an observable high-quality legitimacy resource signal. Environmental certification is viewed as an intangible resource that encourages innovation and legitimacy, and promotes superior firm performance. Accumulation of the legitimacy certification resource from the Eco-lighthouse Foundation can confer benefits. Notably, the adoption of new work practices that focus on innovation, cost-efficiency and sustainable entrepreneurship, and an organization profile that reduces the information asymmetries perceived by potential external resource investors. For certified firms, our arguments suggest

that the value of acquiring legitimacy by participating in an environmental certification programme can go beyond the immediate benefit of this signal.

Signalling theory suggest that the benefits of inter-organizational relationships can depend on the informational environment of signals (Reuer et al., 2012). The perspective we develop suggests that the signalling value of certification varies according to the age and employment size of signalling certified firms. Our specific theoretical focus is on the accumulation and mobilization of a certification legitimacy resource, which can be signalled to address information asymmetries faced by sustainable entrepreneurship firms suffering from the liabilities of newness or smallness. A novel conceptual contribution of this study is the exploration of whether very young, young, micro and small firms that accumulate the compounded credible high-quality signal of certification are able to buffer the liabilities of newness or smallness, and to report superior financial firm performance. Interaction effects between the environmental certification resource and types of firms according to firm age and employment size are explored for the first time. We provide fresh insights surrounding whether all, or particular types of private firms, benefit from accumulating and mobilizing the environmental certification resource. Our study complements and extends prior sustainable entrepreneurship research with arguments and findings that suggest the sustainable entrepreneurship firms' high-quality environmental certification resource investment signal positively promotes superior financial firm performance, specifically with regard to higher levels of effectiveness.

Evidence from the OLS regression models confirmed that those very young and micro firms that reported the compounded signal of certification reported higher levels of effectiveness. Very young and micro ELC firms thus compensated for the liabilities of newness or smallness, and mobilized the certification legitimacy resource to significantly enhance their effectiveness. Also, micro firms that cited the compounded signal of

certification reported weakly higher levels profitability. The analyses did not confirm that those very young and micro firms that cited the compounded signal of certification reported lower levels of inefficiency. As detected elsewhere (Westhead et al., 2011), the variables found to be statistically significantly associated with one performance dependent variable are not consistently the same as those significantly associated with another performance dependent variable. These findings highlight the need for multiple firm performance indicators to be considered in private firm studies, which key into the goals of a certification programme, as well as the goals of firm owners and external stakeholders. In part, the initial financial and time costs associated with the implementation of environmental certification may have compromised an ELC firm's ability to immediately deliver an efficient market offering. Certification can reduce information asymmetries and uncertainty perceived by external resource providers seeking credible and plausible information from smaller private firms (King et al., 2005). In Norway, certification can be an essential requirement when bidding for tender opportunities. The high-quality signal of ELC certification enables external resource providers to identify firms with better quality attributes that otherwise would be difficult to observe. ELC certification encourages certified firms to increase their sales revenues, which can generate immediate superior firm effectiveness. However, the benefits of certification relating to lower firm operational expenditure and reducing inefficiency need to be monitored over longer time periods of evaluation.

Several control variables were significant. Firms located in towns and those engaged in industries with high dynamism reported higher levels of effectiveness. Manufacturing firms, those with high levels of slack, and those engaged in industries with high munificence reported lower levels of effectiveness. Trade firms and those engaged in industries with high dynamism reported higher levels of inefficiency. Firms engaged in industries with high dynamism reported higher levels of profitability. Manufacturing and trade firms and those

with high levels of slack, and those engaged in industries with high munificence reported lower levels of profitability.

We make several methodological contributions to the study of the benefits of sustainable entrepreneurship. Data from a large representative random sample of private firms that had obtained environmental certification was collected. Notably, this study explores whether firms that accumulate certification report superior performance with regard to three rather than a single performance indicator. With reference to the emerging sustainable entrepreneurship literature, a novel contribution of this study is to explore the performance of firms with the environmental certification legitimacy resource relative to comparable firms that do not have this resource to mobilize. We recognize that the selection bias of participating in the environmental certification programme or not can distort subsequent firm performance. This potential selection bias has not been considered in the extant sustainable entrepreneurship literature. The Heckman two-stage test confirmed that the sample of sustainable entrepreneurship firms is random, and the performance OLS regression models are not distorted by selection bias.

Practitioners can have a role in addressing the attitudinal and financial barriers to the take-up of environmentally friendly actions. Owners of private firms may not participate in environmental certification programmes because they are unaware of the benefits associated with acquiring the certification legitimacy resource. Large sample empirical studies and case study examples are required to illustrate the costs and benefits of obtaining environmental certification according to firm age and employment size type, as well as firm industry and location context. This study has illustrated that micro firms seeking to address the liabilities of smallness and very young firms seeking to address the liabilities of newness are able to increase their effectiveness after acquiring certification. Presented empirical findings (and case study examples of successful certified firms in contrasting locational and industrial

settings) could be more widely disseminated to private firms to illustrate that environmental certification is an investment and not solely a cost. This evidence base could address the attitudinal barrier and increase participation in environmental certification programmes (Lourenço et al., 2012; Schaper, 2002). Practitioners seeking to promote sustained private firm competitive advantage and value creation could encourage (i.e., by supplying more information) and directly support (i.e., by covering the full or partial cost of certification) more private firms to pursue environmentally friendly strategic renewal adaptation strategies with regard to high internationally recognized clear standards and methods of practice to reduce pollution (York and Venkataraman, 2010). Further, practitioners could support networking initiatives (i.e., role model mentoring) that link successful environmentally friendly public and large private certified organizations with private firms considering (or recently pursuing) environmentally friendly actions. However, the onus is on owners of private firms to engage in environmentally friendly actions, which enable them to accumulate and mobilize the certification legitimacy required to improve the flow of vital external resources, and the adoption of work practices that promote a focus on sustained competitive advantage and value creation.

#### *Limitations and future research*

Inevitably, this study is associated with limitations that provide fruitful avenues for future research. Additional research is warranted surrounding the broader array of internal and external environmental factors that promote a focus on environmental certification. Social norms can shape the adoption of entrepreneurial sustainable actions (Meek et al., 2010), and the interaction between incumbents and newcomers can challenge current institutional conventions (Hockerts and Wüstenhagen, 2010). There is, therefore, a need to monitor the take-up and benefits of environmental responsibility certification programmes over time, and

to consider wider contextual issues (De Clercq and Voronov, 2011). Additional qualitative and quantitative studies could explore with reference to alternative firm age and size contexts, the specific contributions made by external consultants and auditors during the certification process with regard to developing social capital; relationships with other organizations that promote trustworthiness and legitimacy for young and small firms; and the take-up of specific environmentally friendly strategies that comply with industry specific requirements that have a positive impact on firm competitive advantage and performance.

Future studies could measure the types of legitimacy (De Clercq and Voronov, 2011) reported by private firms before and after participation in an environmental responsibility certification programme. Linkage between the type of legitimacy facilitated by an environmental certification programme and the subsequent ability to accumulate amounts and types of external resources could be monitored. Future studies could explore the linkages between the subsequent amount and type of external resources obtained by certified firms and their subsequent performance. Given our focus on environmental certification as a signal, there is also the opportunity to examine what other signals can be used to address the liabilities of firm newness, or smallness. Research might explore whether signals substitute for each other. Further, studies exploring contingencies might identify the boundary conditions of the signals (Reuer et al., 2012).

Studies need to consider the resource profiles of key entrepreneurs (Kuckertz and Wagner, 2010) with regard to archival and survey data (Mueller et al., 2012). Entrepreneurial knowledge and knowledge relating to the natural environment can shape the discovery of sustainable development opportunities (Patzelt and Shepherd, 2011). Experienced entrepreneurs could be more likely to recognize the benefits of signalling legitimacy, and they may also be more effective at using a wider range of visual and certification endorsement symbols to enhance firm development. Future research could consider whether habitual

entrepreneurs with prior business ownership experience (Westhead et al., 2011) are more likely to participate and benefit from environmental certification programmes, relative to novice entrepreneurs with no prior business ownership experience. If habitual entrepreneurs with environmental certification perform better than novice entrepreneurs with environmental certification, there is a case to maximize the short-term returns from environmental certification intervention by targeting support to habitual entrepreneurs who could subsequently act as role models and mentors for novice entrepreneurs in the future.

The benefits of environmental certification programmes need to be monitored with regard to total wealth creation. Future output studies could monitor a broader array of competitive advantage (i.e., introduction of specific procedures and practices, effectiveness, efficiency, etc.), firm performance (i.e., financial performance, productivity, sales, jobs, export propensity, etc.) and environmental and societal performance (i.e., reduced waste and pollution, more efficient use of natural resources, improved employee relationships, employee diversity, better firm governance, improved product quality, contribution to the local community, etc.) benefits reported by firms with and without environmental certification. Panels of private firms that participate and do not participate in certification programmes in contrasting localities and industries need to be monitored over long periods of time, and with reference to short and long-term measures of firm performance. Cost-benefit analysis studies are also warranted.

This study was limited to Norwegian firms and with reference to one environmental certification programme. Presented findings can be generalized to the Norwegian context, and potentially to other contexts with similar cultural, economic and political conditions. To examine the generalizability of our findings (i.e., external validity), additional studies are warranted in other cultural, national, locational and industrial settings (Halme et al., 2009), and with reference to several environmental certification programmes.



## **Conclusion**

We extend signalling theory to the literature on sustainable entrepreneurship, joining together streams of research on sustainable entrepreneurship, legitimacy and signalling with superior firm financial performance. By focusing on firms that participated in an environmental certification programme, we identified the firm performance benefits associated with the innovation, efficiency and sustainable entrepreneurship practices and the cognitive, pragmatic, moral, and organizational legitimacy signal promoted by the programme. Building upon insights from the RBV of the firm as well as institutional and signalling theory, we conceptualize environmental certification as an observable firm high-quality resource investment signal, which generates legitimacy to certified firms, and improves flows of resources from external stakeholders to certified firms. Beneficial attributes relating to legitimacy, reliability and accountability garnered by certification were monitored over a 12 month period. Our arguments and evidence suggest that younger and micro firms with the environmental certification legitimacy signal particularly address the liabilities of smallness, and weakly the liability of newness. We interestingly detected that the compounded signal of certification with very young or micro firms was associated with significantly superior effectiveness. Also, micro firms that reported the compounded signal of certification reported weakly higher levels profitability. External interventions from the consultant and/or the auditor during the certification process promotes firms to design and implement more appropriate strategies, which facilitates an immediate focus on effectiveness improvements, rather than increased profitability and lower inefficiency. Additional research is warranted to explore the specific roles and benefits of the external consultant and/or auditor in future evaluations of certification initiatives. We hope that this study encourages more research on signalling theory and the role of legitimacy, innovation and efficiency work practices in the

sustainable entrepreneurship context over longer time periods of analysis and in diverse environmental contexts, and with regard to a broad array of firm performance measures.

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Table 1. Descriptive Statistics and Correlation Matrix (n = 1,152)

	Mean	S.D	VIF	1	2	3	4	5	6	7	8	9	10	11
Control Variables														
1. Town	0.32	0.47	1.10											
2. Munificence	0.82	2.04	2.11	-0.03										
3. Dynamism	9.58	1.63	2.35	-0.06*	-0.19**									
4. Trade	0.41	0.49	2.77	-0.06	0.26**	0.23**								
5. Manufacturing	0.31	0.46	5.10	-0.09**	-0.65**	0.42**	-0.56**							
6. Slack	0.54	0.22	1.05	0.04	0.04	-0.08**	0.05	-0.07*						
7. Market	0.00	0.00	1.16	0.03	0.11**	-0.15**	-0.08**	0.02	-0.02					
Independent Variables														
7. ELC	0.50	0.50	1.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.05				
8. Very Young	0.12	0.32	1.31	-0.03	0.03	-0.15**	-0.05	-0.04	0.17**	-0.03	-0.02			
9. Young	0.56	0.50	1.22	0.01	-0.01	0.00	0.02	0.01	0.00	0.01	-0.02	-		
												0.40**		
10. Micro	0.32	0.47	2.19	-0.04	0.07*	0.03	-0.02	-0.10**	0.04	-	0.00	0.13**	0.03	
										0.12**				
11. Small	0.50	0.50	2.15	-0.11**	-0.11**	0.02	-0.10**	0.18**	-0.04	-0.07*	0.00	-0.06*	0.02	-0.69**

Notes: \* p &lt; 0.05; \*\* p &lt; 0.01 (two-tailed).

Table 2. Variables Associated with Firm Efficiency, Inefficiency and Profitability: OLS Regression Models

	Model 1 <sup>ab</sup>	Model 2 <sup>b,c</sup>	Model 3 <sup>b,c</sup>	Model 4 <sup>b,c</sup>	Model 5 <sup>b,c</sup>	Model 6 <sup>b,c</sup>	Model 7 <sup>b,c</sup>
Dependent variable	Step 1	Step 2	Step 2	Step 2	Step 2	Step 2	Step 2
Control and Selection Variables	ELC	Effectiveness	Effectiveness	Inefficiency	Inefficiency	Return	Return
Town	-0.01	0.13**	0.14**	-0.03	-0.02	0.01	0.01
Munificence	-0.01	-0.07***	-0.07***	-0.01	-0.01	-0.02**	-0.02**
Dynamism	0.01	0.27***	0.27***	0.07***	0.07***	0.02**	0.02**
Trade	-0.02	0.00	0.01	0.07**	0.07**	-0.07*	-0.07*
Manufacturing	-0.07	-0.54***	-0.53***	-0.07	-0.07	-0.17***	-0.17***
Slack	0.06	-0.45***	-0.43***	-0.04	-0.03	-1.05***	-1.06***
Market	446.27**	2357.92***	2401.07***	831.95***	833.66***	144.09**	152.26**
Paper	0.00						
Plastic	0.00						
Glass	0.00						
Independent Variables							
ELC		0.21***	0.01	0.00	-0.04	0.05*	-0.03
Very Young	-0.15	-0.05	-0.21**	0.06*	0.01	0.07*	0.11*
Young	-0.09	0.02	0.06	0.02	0.01	0.00	-0.02
Micro	0.05	-0.14**	-0.40***	0.01	-0.02	-0.05	-0.10*
Small	0.05	0.10*	0.05	0.04	0.04	0.02	-0.01
Interaction Variables							
Very Young × ELC			0.30**		0.10		-0.08
Young × ELC			-0.11		0.02		0.02
Micro × ELC			0.53***		0.05		0.11*
Small × ELC			0.10		0.00		0.06
Constant	0.30	4.70***	4.78***	7.87***	7.89***	0.46***	0.46***
n	1,152	1,152	1,152				
R <sup>2</sup>		0.31	0.32	0.15	0.14	0.20	0.20
Adjusted R <sup>2</sup>		0.30	0.32	0.15	0.14	0.19	0.19
F-value		42.37***	34.06***	16.40***	12.43***	23.53***	17.81***
Inverse Mill's ratio		-0.53		-0.64		0.16	
χ <sup>2</sup> statistic		405.15***		87.05***		370.12***	

Notes: <sup>a</sup> = Heckman step 1 selection model; <sup>b</sup> = Beta coefficients; <sup>c</sup> = Inverse Mill's Ratio was not significant during Heckman step 2. This confirms the absence of selection bias, and the OLS model is estimated without correcting for sample selection bias via the Heckman two-stage procedure; \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01 (one-tailed).